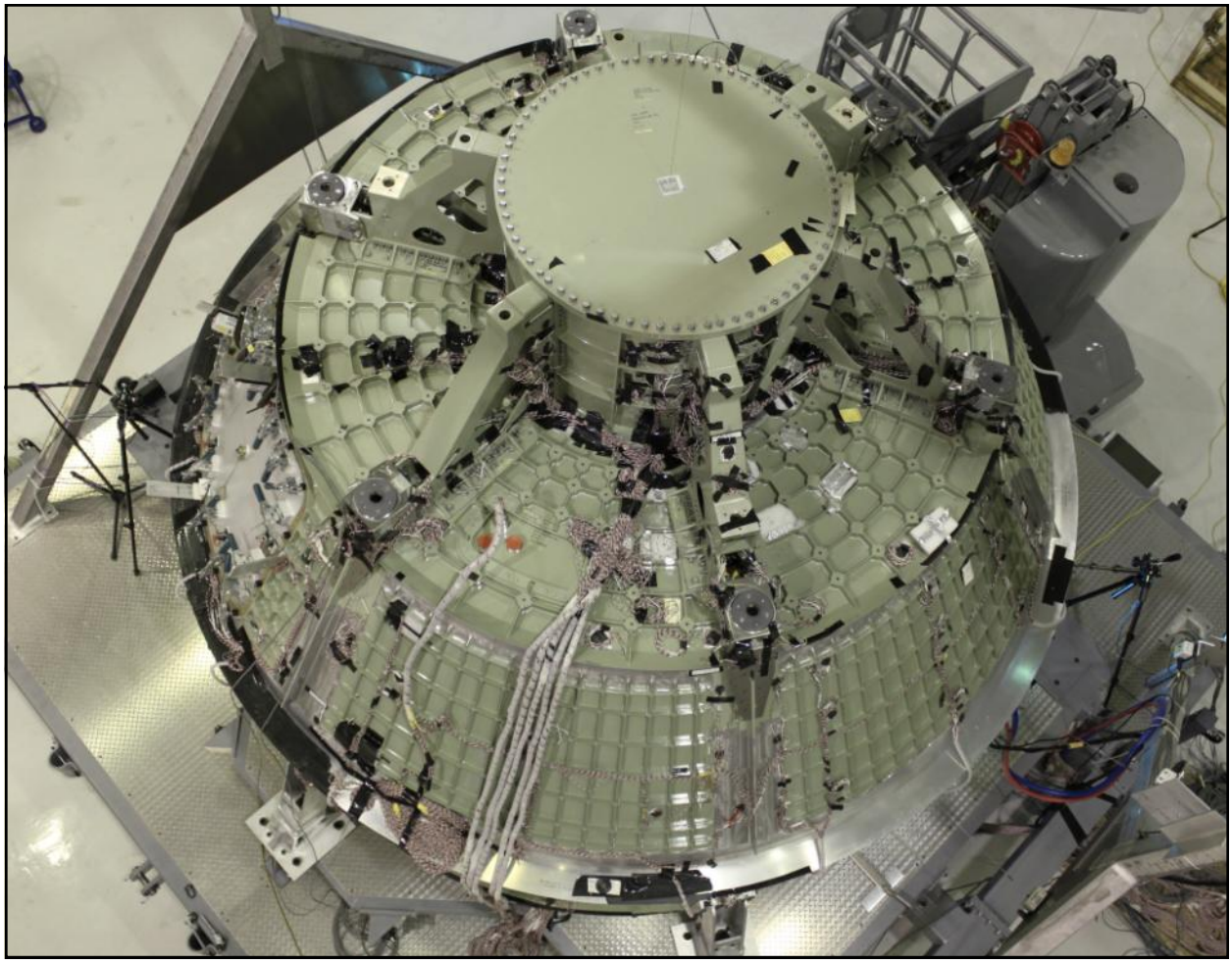
ORION
CREW EXPLORATION VEHICLE

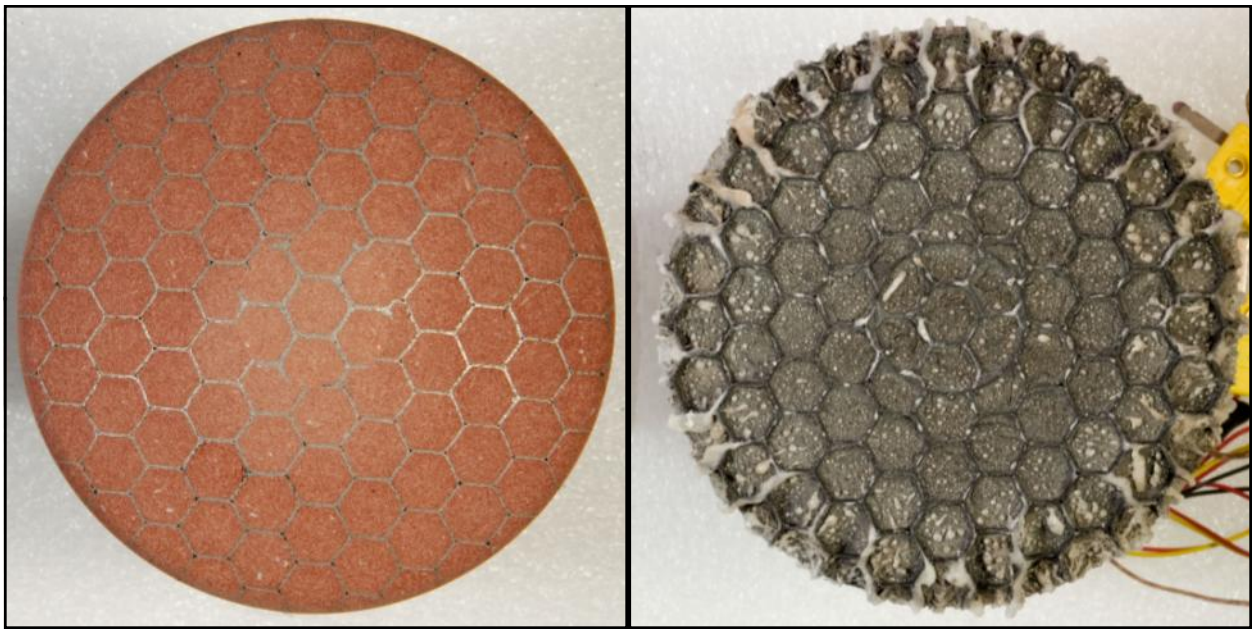
WEEKLY ACCOMPLISHMENTS

09.03.10



The first Orion spacecraft, Orion 1 successfully passed a structural proof pressure test at the Michoud Assembly Facility in New Orleans, Louisiana, paving the way for future tests prior to space flight. Built to spaceflight specifications, the vehicle completed an important series of leak and proof pressure tests. The test incrementally pressurized the spacecraft with breathing air up to 15.55 pounds per square inch – or 1.05 atmospheres, which is the equivalent pressure a scuba diver's gauge would read at a 35-foot depth.

The successful tests demonstrated a leak-free structure fabricated using self-reacting friction stir welding techniques, a technology that produces stronger and higher quality joints when compared with conventional welding approaches. The pressurization test demonstrated weld strength capability, and advanced aluminum-lithium alloy structural performance at maximum flight operating pressures. Test engineers monitored and collected data from 600 channels of instrumentation to support margin assessments and confirm design accuracy. Following additional testing in 2010, the assembled crew module will be mated to the launch abort system to undergo ground tests in flight-like environments in 2011.



Recently, the Orion Thermal Protection System (TPS) team conducted two arc jet test series which will help develop analytical models used for designing the Orion Heat Shield. The first test series was conducted at Johnson Space Center in Houston, Texas and included the use of 4" diameter Avcoat samples (shown above before and after) featuring a modified fabrication process. The second series of tests, conducted at the Ames Research Center in Moffett Field, California, feature 4.5" square Avcoat models in a wedge configuration. The wedge testing yields important data about material behavior in an aerodynamic shear environment. The test team then performs post-test laser scans which yield detailed measurements of the complex material surface created in this type of test.

Orion team members from Metal Technologies, Incorporated in Albany, Oregon are shown left with 36 C-103 forgings for Orion R-1E Production Nozzles ready for shipment to Aerojet in California. The forgings (also shown in banner on page 1) will be machined to the correct contour, and assembled with injectors, valves and nozzles into R-1E engines.

The Orion service module has 16 R-1E engines arranged in groups of 4 called pods.